

# **Projections of Remedy Effectiveness Using the Working LPR/NB Model**

**November 14, 2013  
EPA/CPG Meeting**

# Outline

- Sediment COPC concentrations at the start of projections
- Assumptions about hydrodynamics and sediment transport
- Assumptions about boundary conditions
- Method for simulating active remediation
- Design of the targeted remedy
- Ongoing efforts

# Relationship of CPG to EPA Model on Projection Simulations

Modeling Approach	EPA	CPG
Sediment 2378-TCDD Concentration at Start		
Initial Condition	~√	~√
Assumption about Hydrodynamics and Sediment Transport (HST)		
Hydrograph	√√	
Initial Bathymetry	√√	
Post-dredge Bathymetry	√	X
HST Implementation	~√	~√
Assumption about Boundary Conditions		
Solids Loads	√√	
2378-TCDD Loads	√√	
Method for Simulating Active Remediation		
Residual	√√	
Solids Release	√	X
2378-TCDD Release	√√	
Dredge schedule	~√	~√

# Sediment 2378-TCDD Concentrations at the Start of Projections

- EPA ☐ used predictions of 2010 conditions derived from model run from 1995 to 2010
  - 1995 initial condition set with EPA mapping/dataset
    - EPA LPR Dataset includes select 1990 to 2011 data
- CPG ☐ used predictions of 2012 conditions derived from model run from 2010 to 2012
  - 2010 initial condition set with CPG mapping/dataset
    - CPG LPR dataset includes 2007 to 2012 data for surface; 1991 to 2012 data for subsurface
- Both EPA and CPG impose vertical gradients for continuous concentration profiles, but with different approaches

# Assumptions about Hydrodynamic and Sediment Transport (HST)

- Future hydrological conditions are similar to the calibration period between WY 1996 and 2010 ☐ both EPA and CPG loop this hydrograph
- EPA ☐ Continuous HST run for 45-year projection (?)
- CPG ☐ Continuous HST run for the first 15 years of projection and cycled 2 times for the remaining 30 years
  - Based on 50-ft post-dredge bathymetry in NB/Kills
  - Maintenance dredging implicitly reflected through the cycling of HST results
  - No adjustment of bed elevation due to dredging

# Assumptions about Boundary Conditions

- Boundary conditions are tied to the hydrological assumptions
- ST Model
  - Repeated solids loads from WY 1996-2010 for each of three 15-year projection cycles
- CFT Model
  - Used 2378-TCDD input files received from EPA in April 2012
    - Concentration continuously declined from the end of WY 2010 for Kill Van Kull and Arthur Kill (based on regional CARP output)
    - Repeated WY 1996-2010 values for tributaries (based on HQI loading functions)
  - Also repeated point source loads, non-point source loads, and atmospheric loads from WY 1996-2010

# Simulation of Active Remediation Remedial Alternatives

- Evaluated a number of alternatives, including
  - Monitored Natural Recovery (MNR)
  - Targeted Remedy (TR)
  - EPA FFS Dredge/Cap with realistic schedule (D/C)
  - EPA FFS Full Dredge with realistic schedule (FD)
- All alternatives included removal of RM 10.9 and Tierra Phase 2 areas
  - Remediated Tierra Phase 1 area prior to the projection
- Remedial footprint/dredge volume for Dredge/Cap based on the dredge input from EPA (April 2012)
- Dredge volume for Full Dredge were estimated based on available information
  - Total dredged volume was similar to EPA's full dredge



# Simulation of Active Remediation Dredge Schedule and Sequence

- Remediation started in July 2013
- Based on realistic dredge rate
  - Overall production rate = 240,000 cy/year
  - No dredging during winter and fish window
  - Capping time not included
- Dredged from upstream to downstream
  - Except RM 10.9 area was removed first in July 2013

Alternatives	EPA	CPG
Targeted Remedy	---	3.3 years
Dredge/Cap	4.7 years	14.4 years
Full Dredge	10.7 years	42.0 years



# Simulation of Active Remediation

## Remediation Code

- HST model code documented in January 2013 memo to EPA
  - Solids release was not included in projections
- CFT model code received in April 2012
  - Corrected a code error with EPA/HQI in February 2013
  - Slightly modified code to simulate targeted remedy in April 2013 (details to follow)
  - Other CFT modifications as previously noted (simplified fluff treatment, spatially variable mixing, gross carbon flux)

# Simulation of Active Remediation

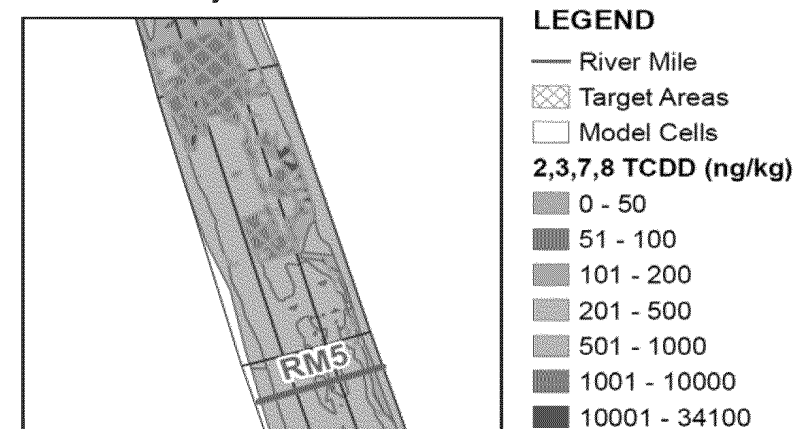
## Remediation Settings

- Remedial settings
  - Cap material has the same bed properties as native sediments
  - Residual concentration = 0
  - Release 3% of dredged 2378-TCDD mass to water column
  - Estimated 2378-TCDD concentration below 5.5 ft based on CPG mapping

# Simulation of Active Remediation

## Implementation of Targeted Remedy

- Identified areas with surface 2378-TCDD > 500 ppt
  - Based on the CPG mapped 2010 surface
  - Dredged 2 feet of sediment and capped to grade
- Simulated partial-cell remediation for targeted remedy ☐ required minor code change
  - Specified a dredge ratio for each cell based on the post-remedial concentration reduction in the surface layer
    - Adjusted residual concentrations for all bed layers
    - Adjusted dredge mass for release



# Refinement of Projections

## Ongoing Efforts

- Ongoing HST/CFT model development, as previously noted
- Review and refine projection inputs and approaches
  - Consider continuous HST vs. looped HST
  - Consider updating to post-dredge bathymetry
  - Include solids release for dredged material
  - Update dredge/cap and full dredge alternatives to use more recent EPA remediation files (received March 2013)
- Review boundary conditions approach using CWCM data
- Review model settings for COPCs other than 2378-TCDD
- Develop targeted remedy based on updated COPC mapping